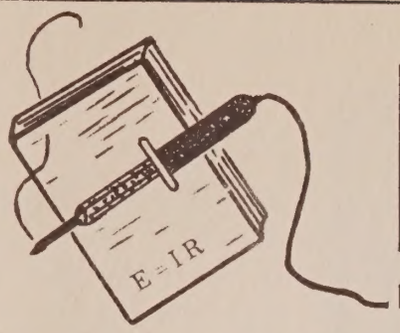
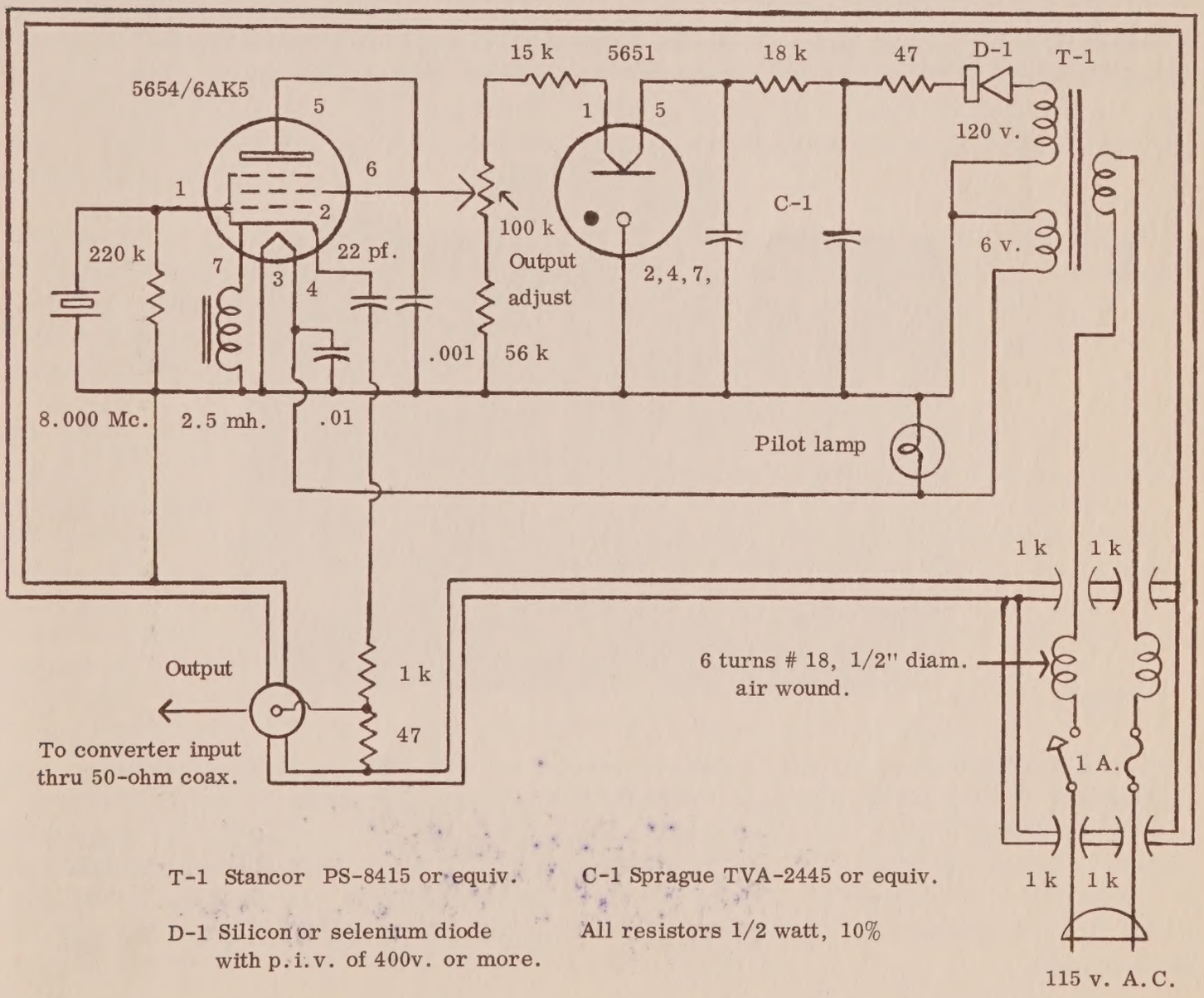


VHFER

LEARN BY DOING

50 MC. AND UP

Volume 3, No. 7 July, 1965



T-1 Stancor PS-8415 or equiv.

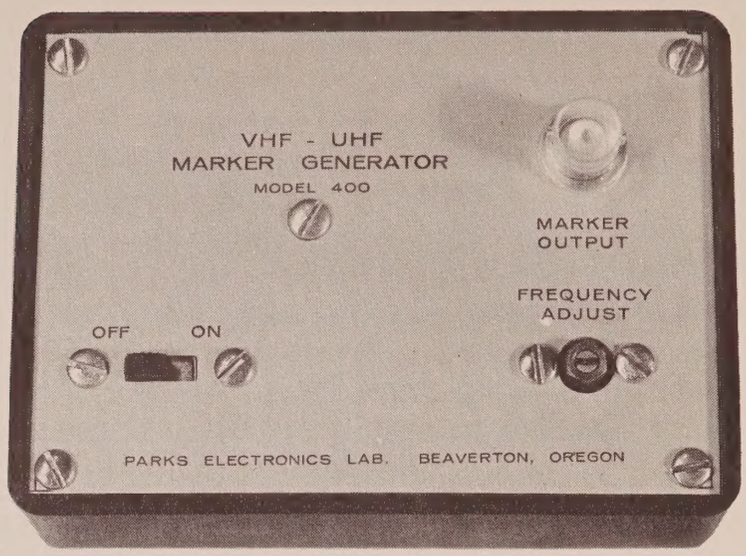
C-1 Sprague TVA-2445 or equiv.

D-1 Silicon or selenium diode with p.i.v. of 400v. or more.

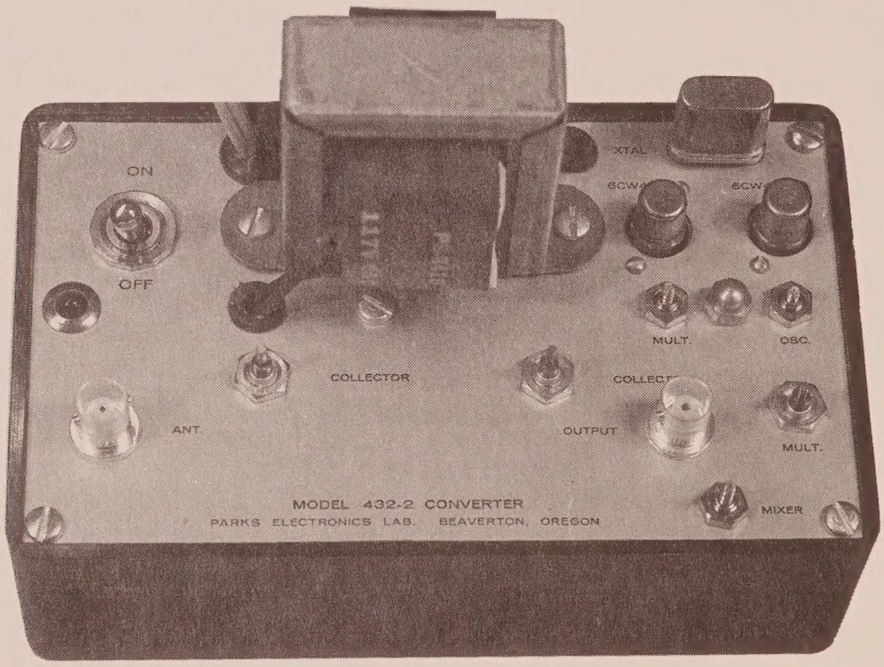
All resistors 1/2 watt, 10%

144 MC. WEAK SIGNAL SOURCE

TWO NEW PRODUCTS



Here's the marker generator described in the May VHFER. We got requests from hams who wanted to buy it so we decided to make it. Price is $25, postpaid. Gives markers every 1 Mc. thru and beyond 1296 Mc. Adjust against WWV. Delivery late August.



This is a modification of our all nuvistor converter for 432. The noise figure is lower, the front end is more tolerant of antenna mismatch, and there is more gain to cover the noise of your receiver. Transistors (underneath) are two 2N3399s as r.f. amplifiers, and a 2N3478 mixer. The two nuvistors are used in a Butler-type oscillator. No internal batteries--all a.c. powered. Guaranteed to please. $54.95 postpaid. Those of you who have our Model 432-1, we can up-date it to make it exactly like the 432-2 including a new panel for $10, postage paid.

parks electronics laboratory route 2, box 35 beaverton, oregon

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ODDS & ENDS
by K7AAD

July has been a month of very heavy VHF activity on the west coast, starting with the A.R.R.L. National Convention in San Jose June 3 and ending with the very successful moonbounce work on 432 Mc. July 24. While building stuff is fun, there comes a time to evaluate what you have. This issue has quite a bit of that sort of thing in it. As an example, if you listened for the KP4BPZ moonbounce signals and couldn't copy it close to 100% (both CW and s.s.b.), you have a very sick receiving set up. The W7UAB-W7UDM team tried using a dipole for a receiving antenna and found they could copy BPZ moonbounce signals on both s.s.b. and CW. They used a Parks preamp. (432-2P)

Apparently KP4BPZ had transmitter trouble on July 3 because everyone I've heard from reported a.c. on the CW note and the speech was plenty readable but kind of garbled. On the 24th, however, everything was cleaned up.

In the last VHFER I referred to a KW 432 amplifier described in QST as measuring 20% efficiency. This information came to me on a 75 meter VHF net. I found out later that I hadn't gotten all the information, due to QRM and QRN. This final wasn't being driven into grid current, so the comparison with W7UDM's final efficiency of 50% in Class C was completely invalid. I should have checked that. My apologies to all of you whom I might have misled.

The metalwork for the 432 tripler I mentioned last time is going along well. The tripler measures about 30% efficiency. Using a 4X150 (pushing it hard) the output on 432 is about 120 watts with 1600 volts at 230 ma. in. It requires about 10 watts of drive at 144. Several of these triplers are being made up in different versions to be tried out by various hams before being described in VHFER. A metalwork kit will be offered.

We have W1OOP's preamp. for 432 here using the selected RCA 2N3478 with a cavity input and it works darned well. His preamp. with the cavity performs the same as our production preamps without a cavity on our test equipment. Hank says the insertion loss of this cavity is less than 1/2 d.b. which is a small price to pay for the added selectivity it gives. I believe this selectivity is important where TV signals are extremely strong and mixing occurs in the transistors. We have had only two reports of this with about 75 preamps in service. One was from Hank and the other from a ham in Arlington, Va. Maybe others have had a problem and have gone to cavities. Apparently tho a very small percentage of hams have run into this. This sort of thing is more common with transistors than with tubes. That figures. You never get something for nothing.

The Amperex 1N4885/H4A power varactor can handle 40 watts of input on 144 with about 22 watts out on 432, according to the manufacturer's data sheets. Over 50% efficiency is pretty good. K7CCW has one built that we are testing. Varactor triplers are sure the easy way to get on 432, fone or CW. If you modulate the 144 drive the 432 doesn't sound too sharp at high modulation levels but it is readable. We'll be making them when we can get around to it. See W1OOP's article in Oct. 62 QST.

All of you who sent in $3 for a 2-year subscription to VHFER are only getting a year and a half. The ad in 73 was in error because the rate changed the first of the year and we didn't notify the 73 staff. Advertisers don't foot the bill in this mag., readers do most of it. I hope you think you're getting your money's worth. About three kilobucks has gone into new equipment to put out this mag. in the last 3 months. Bear with us.

VHFER now caters to the intermediate and advanced VHF ham. We feel the beginner is adequately cared for by others. We want to help up-grade VHF amateur radio.

MOON BOUNCE REPORT
by Tom Curran, W7UAB

The signals on 432 from KP4BPZ on July 3 were good though somewhat unclear from a.c. on the carrier which affected the c.w. tone and the sideband quality. W7CNK in Seattle reported that signals were so strong he could copy the c.w. while climbing the dish outside the shack. Lucky used the 15 foot parabolic dish at the U. of Wash. antenna range. The feed was a vertical dipole tuned for 450 Mc. He placed his Parks transistor preamp at the dish and ran 100 feet of RG 58/U to the converter in the shack. He also used the "swampgator" and a Drake 2B. Reported signal strength was from 5-7 to 5-9. In 2 1/2 hours of copy (which he taped) he did not miss a word on either c.w. or SSB. There was some fading, some problem getting the dish to track. He states that the SSB had a hollow sound, something like aurora--but that he could hear Sam's beard rubbing against the mike. He believes they also heard W1BU but were not sure. No other SSB was heard.

On July 24, WA6LET at Stanford was the first station worked. Members of the UHF Radio Society (W6GD) and the Stanford Research Institute Club operated the 150' dish. Power into the dish was 300 watts from an overworked 4CX250B. Receiver was a Parks 432-2 converter---no preamp---into a 75A3. Report received was 5-6. A tape recording received from WA6LET had portions of their 20 minute contact with K2MWA/2. Signals ran about 10 db above the noise. KP4BPZ was about 45 db above the noise. They also had their own echoes on the tape which they measured at 3 db above the noise. The sideband echoes were quite Q5. They had a partial contact with DJØLO.

K7ZIR in Aloha, Ore. used 4 Gibson yagis in a quad spaced 5' apart (see photo) on a home-made polar mount operated just as shown--on the ground and right through the power line. Measured power at the antenna was 270 watts. He gave BPZ a 5-6-9 and received 5-5-9. He used a Parks 432-2 converter. Jim noticed that when the sun came up his background noise came up noticeably. Moonbounce started at 4 a.m. in Oregon.

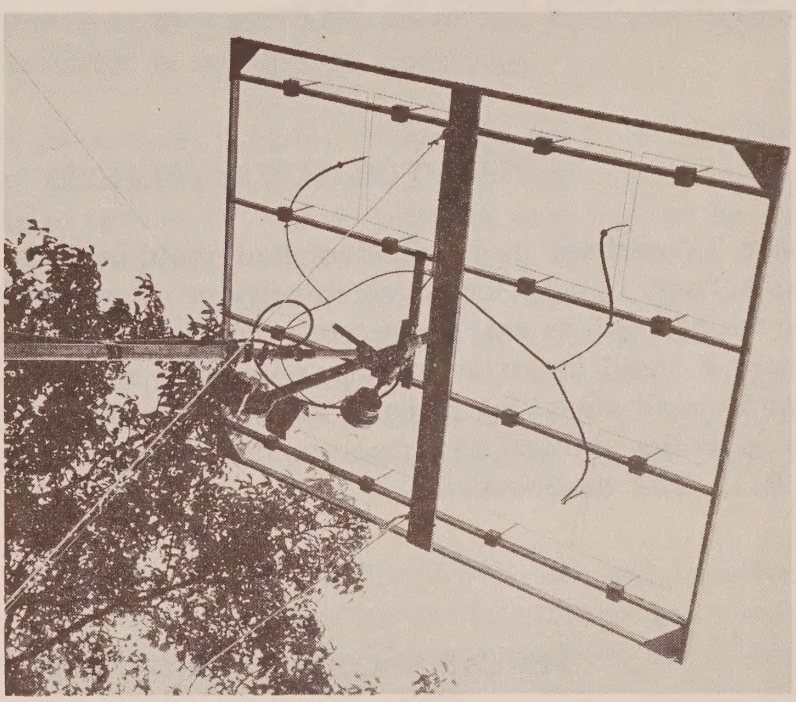
The station with which I was associated was W7UDM/7. We used an antenna with 16 driven dipoles and a screen reflector. Basic design was from the Frank Jones Handbook. The center of the antenna was about 10' high. (see photo). The polar mount was constructed of pipe fittings. We used a Parks transistor preamp into a home-made nuvistor converter to a 75S-1. Signal report received was 5-5-9, given was 5-6-9. At times the Moonbounce Filter described in the March VHFER was used. It improved the signal to noise ratio considerably tho it wasn't necessary. Pointing of the antenna didn't seem to be very critical.

WB6FSC/6 in Mountain View, Calif. worked BPZ and got a 5-6-9. He runs 1 KW input, 600 watts output to a cavity amplifier built by WA6BAN. The receiver was a paramp. built by K6IMZ with noise figure on the order of half a db., then into an 8058 converter (8 db n.f.) and a Drake R4 (400 cycle bandwidth). The antenna was a 64-element extended-expanded colinear (32 driven elements.) Chuck reports that he heard K2MWA/2 working WA6LET but the K2 was right at the noise level. He thinks a good c.w. operator could have copied them. He comments that KP4BPZ should have given the freq. of each station he worked so others could listen for them. It happened that the K2 was right on WA6LET's frequency. Had it not been for that he probably wouldn't have found them. He says" I am almost positive this station was the best, short of a larger antenna, that could be achieved." Sounds like they're way out in front, anyway.

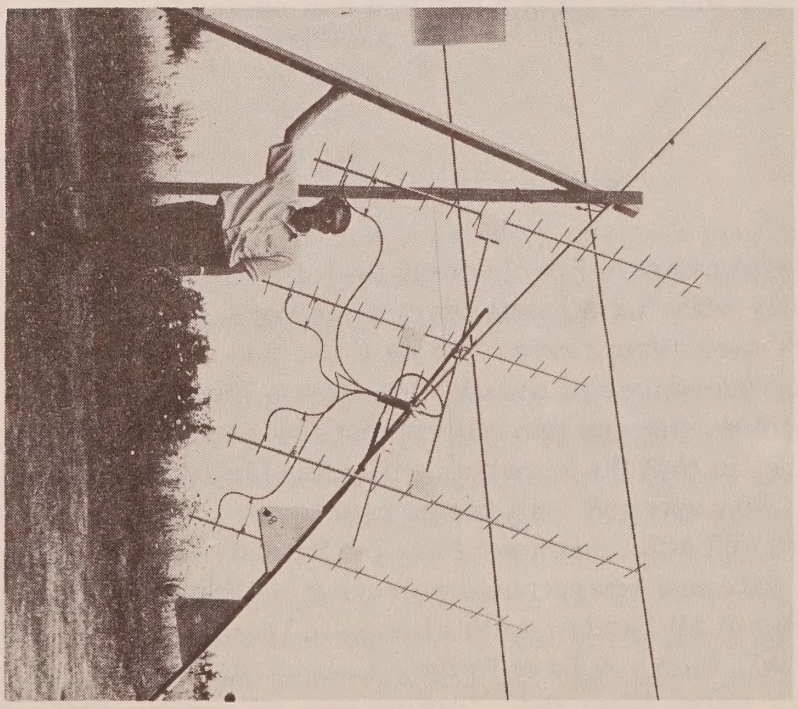
*7965 S.W. 87th. Portland, Ore.

Some of the signal reports given by KP4BPZ are as follows:

WA6LET	5-6	KØDLK	3-4-9
W3FCZ	5-6-9	K7MMT	5-4-9
DJ4AU	4-4	W1TQZ	3-4-9
WB6FSC	5-6-9	K2CBA	5-6-9
G3CCH	4-3-9	W7UDM/7	5-4-9
SM7OSC	3-3-9	W7PUA/2	4-4-9
W6YK	5-6-9	K6JLZ	4-4-9
DJØLO	4-5	K3HOC	4-4-9
K3LPF	5-7	W5LUU	4-4-9
K7ZIR	5-5-9		



16 driven dipoles in front of a screen reflector at W7UDM/7.



K7ZIR and his quad of Gibson yagis on a home-made polar mount.

METEOR SCATTER SKEDS WANTED

NOTE: There are restrictions on listings in this column. You must have a few hundred watts power, a good converter and antenna and you must list the equipment you have. The column is meant to bring together serious meteor scatter enthusiasts,

Want meteor and tropo scatter skeds on 2 meters. Bill Smith, KØCER 1301 Churchill Ave., Sious Falls, South Dakota 57103.

Want meteor scatter skeds on 144 Mc. with Louisiana, Arkansas, Texas, Oklahoma, Kansas, Nebraska and North Dakota, both for major and minor showers. Don Learned, W1AZK, Bear Hill Road, North Chichester, New Hampshire.

Want 2 meter meteor scatter skeds. Victor Frank, WB6KAP (W7QDJ) 12450 Skyline Blvd. Woodside, Calif. , Don Hilliard, WØEYE Box 563, Boulder, Colo., Bill Conkel, W6DNG 4608 La Cara, Long Beach 15, Calif.

NEED FOR CAVITY FILTERS

Many hams have TV garbage in the receiver that could be eliminated with a good cavity filter. The selectivity of very low noise converters or preamps is not the best--they are adjusted to do the best job on extremely weak signals. However, the addition of a cavity filter, in spite of a small insertion loss, can improve reception and may not make a noticeable difference in weak signal reception. Try it on two meters if you have a problem. Construction cost is on the order of $5. One was described in Feb. 65 VHFER. Others are in the new A.R.R.L. VHF handbook.

TIN CAN SOLDERING PROBLEMS

One of the problems reported to K6HCP after his fb article on beer can baluns in QST was that in some areas of the country the cans are made of aluminum. I've heard this about some of the juice cans too, so before you get all set to go on any construction project, better check and see that you have a can you can solder to.

WHAT I.F. FOR YOUR CONVERTER?

There are several criteria for choosing an I.F. range. Many times you have to compromise--especially with "ham bands only" receivers. If you're working very weak signals you need a very slow tuning rate. On an N.C. 300 and similar receivers, the 7 or 14 Mc. i.f. uses more revolutions of the dial to cover a given number of kilocycles. 14 Mc. is a good compromise, but you can only tune a few hundred k.c. of the band. Another advantage of a low i.f. is that the receiver will probably be more stable. If you use an i.f. that is too low, you may get into image problems. 7 Mc. is a low practical limit for two meters. At 220 and 432 a higher i.f. is preferred---a compromise on some receivers between tuning rate and image noise rejection. With receivers such as the Drake, tuning rate is the same on all bands, so the image is the only consideration. If you want to cover the whole band, then you have to forget about tuning rate. Don't expect to hold a weak c.w. signal on a sharp filter tho. Tuning gets extremely difficult, to say nothing of the receiver's local oscillator drift or jumping around.

NOTES ON CONVERTING MOTOROLA FM RADIOS

By Jim McMechan, * WØPFP

There are a lot of old Motorola FM radios of the 30 D transmitter and FMAR 13 V receiver types available to amateurs now at very reasonable prices. These notes are to enable the conversion of this equipment to the 6 meter amateur band. In central Iowa we are using 52.525 Mc. and 52.640 Mc. This requires the use of the following crystal frequencies:

Frequency	Receiver Crystal	Transmitter Crystal
52.525 Mc.	8037.5 Kc.	1641.40625 Kc.
52.640 Mc.	8056.67 Kc.	1645.00000 Kc.

Most of the units we have obtained cam equipped with the K8102, two-frequency adapter for the transmitter. If you do not have one, it may be easily made using a Mini-box. In any case, each crystal socket needs to have a trimmer capacitor in parallel with it. I normally use Erie type 557 8-50 pf. trimmers as they are quite small and have an adequate range. These trimmers allow each transmitter to be tuned to frequency.

Conversion of the transmitter is reasonably simple. Transformer T1 is modified by removing 20 turns. In some cases the oscillator does not always start under load if this is done, so a better modification is to rewind T1 with 44 turns in each half of the winding using the original wire. In the case of T2, merely remove 8 1/2 feet (that's right, feet, not turns.) T3 in our units required removing 8 turns from each coil. T4 requires the removal of 4 rotor and 4 stator plates from each capacitor as well as the removal of 3 turns from each coil. Move the bottom coil up so the two coils are separated by 1/4 inch. These modified coils should have 12 turns. T5 also requires removal of 4 rotor and 4 stator plates from each capacitor and 1 turn from each end of the coil leaving 3 turns tapped 1 turn from the top of the coil.

The final tank coil is 4 turns of the original coil. There may be several capacitors in parallel with the loading capacitor, so remove all these but the tubular ceramic which in most units is brownish-black in color and 75 pf. in value. These capacitors are to adjust the loading to the middle of the variable loading capacitor range.

Tune up is much easier if an absorption wavemeter is used to insure that each transformer is on the proper frequency. These frequencies are:

T-1 and T-2	1640 Kc.
T-3	6.5 Mc.
T-4	26 Mc.
T-5 and Final	52 Mc.

Since the Motorola units were made in 3 frequency range groups, any unit may have different transformers than we found. However, the instructions given show the number of turns in the modified transformers as needed for 50 Mc. operation.

In order to obtain more drive for the 807, the quadrupler screen voltages may be raised. This is done by changing the two 150 K, 1 Watt resistors on the resistor board at the end of the chassis to 68 K, 2 W. If you are going to use the two-frequency adaptor, be sure there is a 5 pf. capacitor from grid to plate of the 7C7 oscillator stage. Also some units do not have an 18 K, 1/2 W resistor from grid to ground on each of the 7A8 modulator tubes. If you cannot find these resistors, add them (unless your unit uses the speech clipper which is a board mounted vertically over the mike transformer.) Finally, on the numbered terminal strip behind the front chassis edge, check the value of the resistor between terminals #19 and #20. This is the mike dropping resistor and should be 470 ohms for 6 volts, 1K for 12 volts and 820 ohms for 12 volts when using the speech clipper.

Typical meter readings obtained from a properly operating unit with a 2K, 50 microampere meter are given in the following table:

Meter Switch Position	Meter Reading
1 Oscillator bias	-30
2 1st Quadrupler grid	-18
3 2nd Quadrupler grid	-27
4 Doubler grid	-20
5 Final grid	-20
PA Final cathode current	Depends on loading
Mod Modulator Bias	-22

The receiver changes are easier, so if you have gotten this far you are about done. The first problem is to determine which of the several models of this receiver you have. Most of our receivers have small coils in shields about one inch square which are marked T810, T811 and T812. The IF transformers in this receiver are of the same type. The 1st IF is 4.3 Mc and the 2nd IF is 1.7 Mc. The second type receiver has large RF transformers which look like the coils in the transmitter, but with the small 2nd IF transformers. The RF coils are marked T811 and T812. This receiver has an APC trimmer for the antenna coil tuning. The intermediate frequencies are the same as for the first receiver. There is also a third receiver which has the large transmitter-size coils for both RF and IF coils. This receiver has a 4.3 Mc. 1st IF and a 455 Kc. 2nd IF. Finally, the fourth type is the precision selectivity receiver which has three of the small-sized transformers between the RF amplifier and mixer and 2.7 Mc. 1st IF and a 2.0 Mc 2nd IF. These receiver transformers are marked T820, T821, T822 and T823. The following modifications have been made on the first three receivers mentioned but do not apply to the precision selectivity model nor do the crystal frequencies given earlier apply to this model.

The receiver with the small RF transformers will be described first. Turns are to be removed from T810, T811 and T812 and it is suggested that they be removed from the top of the coil form to allow the greatest tuning range. On T810 leave 7 1/2 turns, on T811 leave 7 turns in each coil and for T812 leave 7 turns on each coil. This completes the modification of the receiver. Plug in the new high-frequency local oscillator crystal (8 Mc) and retune the receiver.

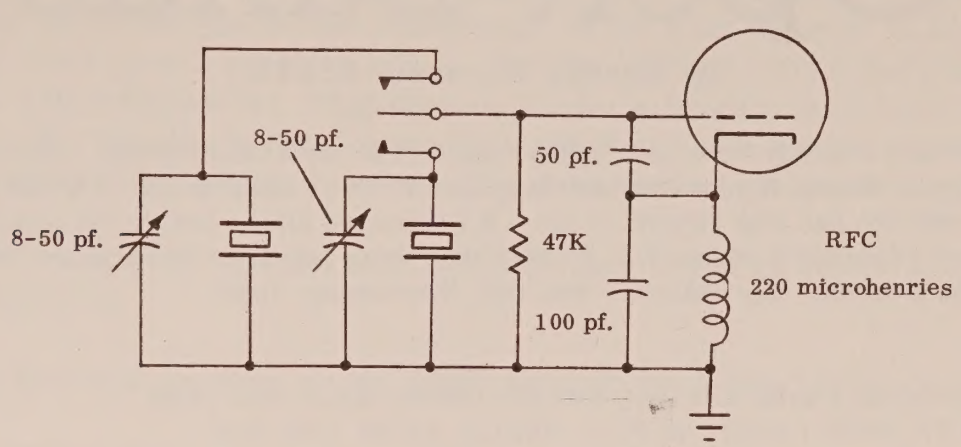
The receivers having the large size RF transformers require the removal of 3 turns from the antenna coil, leaving 7 turns. On T812 remove 2 turns leaving 4 turns. The oscillator coil T811 may have several windings. Be careful to disturb only the winding tuned by the variable capacitor and remove 3 turns leaving 5 turns.

The meter switch positions are listed below to make the tune-up easier. Use a 2K, 50 microampere meter.

Meter Switch Position	
1. 1st Low Frequency IF grid	4. Discriminator Balance
2. 1st Limiter grid	5. Discriminator Primary
3. 2nd Limiter grid	

If it is desired to use the receiver on two frequencies, several changes are necessary. In the transmitter add a lead from pin 5 of the octal plug to pin 2 of the 6 prong socket. The Motorola cables have this lead run to the receiver. This will allow both the transmitter and receiver frequency change relays to operate together. In the receiver add a DPDT relay of appropriate coil voltage with one lead of the coil to ground and the other coil lead to pin 2 of the 6 prong plug. Wire the relay contacts to a double crystal socket which has an 8-50 pf. trimmer in parallel with each crystal socket. The common contact of the relay goes to the oscillator grid. When changing the receiver to 2-frequency operation it is advisable to:

change the high-frequency oscillator to a Colpitts circuit in place of the Tri-tet circuit normally found in the receiver. The sketch below shows the circuit we used here.

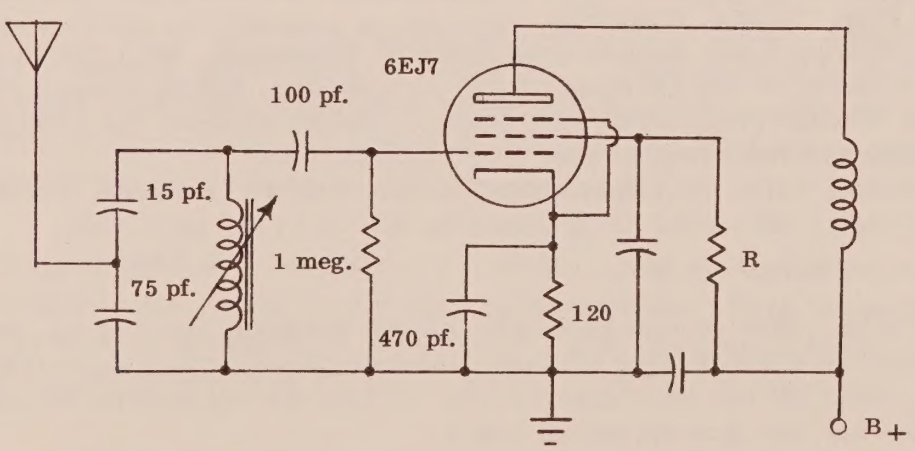


The major job left is optional but well worth the effort. WØLRY suggested changing the first RF amplifier to a 6EJ7. Except for the change in the socket this is not too difficult. Position the grid pin close to the input coil. In the mobile receivers with the small RF transformers, use the original cathode resistor and change the screen resistor to a 1K, 1W. If the grid resistor is 3.3 Meg. or 4.7 Meg., replace it with a 1 Meg. resistor. Since the 6EJ7 filament requires 300 ma., the 12 volt mobile receiver requires a 42 ohm 2 W resistor to balance the filament current. Usually this may be added in parallel with the 7C5 filament but it would be wise to check the filament wiring to be sure. Since the 6EJ7 pin connections are somewhat difficult to find, here they are:

1-cathode. 2-grid 1. 3-cathode. 4-heater. 5-heater. 6-internal shield (do not use.) 7-plate. 8-screen. 9-suppressor grid (tie to cathode at socket.)

In the large-sized transformer receiver it may be necessary to remove the APC trimmer and associated coil if trouble is experienced with oscillation. Replace it with a shielded 1/4" coil as shown below:

Adjust the number of turns in this new coil, starting with about 7 turns spaced 1/2 inch, for resonance with the capacitor values given. Notice that these capacitors form an R-9er type input circuit. Screen voltage on the 6EJ7 should be about 180 volts and the screen resistor (R) is selected to give this voltage in normal operation.



NOTE: Reprints of this article singly or in quantity are available for a stamped, self-addressed envelope to the publisher.

*Route 3, Ames, Iowa 50012

Open Bands

By Marilyn Wiseman, K8ALO

Reports are coming in fairly well, although nothing farther west than Illinois. The bands seem to be in good shape. Reports are starting to come in on 220 and 432. I would like to thank everyone who has sent reports to me. If I answered all the letters I'd certainly have a good case of writer's cramp-hi. So let's keep those reports coming in and I'll report as many as possible. My address: Box 103, Petersburg, Ohio.

50 Mc.

June 10 K1MAI (Conn.) wrkd KP4AST, KP4BPJ (Puerto Rico) 1835-1846.
June 19 WA8FTA (Mich.) wrkd WB6PBU, W6NLZ, K6IBY 1124-1557
June 20 K1MAI (Conn) wrkd WA4SDX (Fla.) KP4BCS, VP7NS, XE1CT 1856-1956.
June 22 WA8GBZ (Ohio) wrkd ZD8LR (Ascension Island), K7VTM (Wyo.) 1555.
July 1 WA8GEG (Ohio) wrkd YV5AGM (Venezuela), KP4AST
July 2 K1MRI (Conn.) wrkd VP7NA 2046
July 5 WA8GBZ (Ohio) wrkd KP4BCS 1935. WA8GEG (Ohio) wrkd WA4WVY (Fla.)
July 7 WA8GEG (Ohio) wrked KØBGF (Iowa), W1FLD (Mass.), K1QQH (Mass.)
July 10 WA8GEG (Ohio) wrkd WA5LBO (Texas)
July 13 K1MRI (Conn.) wrkd VE4MB, VE4YW, VE4JC (Manitoba) W7VTB (Wyo.), K7BHF (Utah) 2001-2225. Also hrd stations at British Guiana and Ascension Isl.

144 Mc. (reports are limited to abt. 250 mi. or more)

June 12 K8ZES (Galion, Ohio) reports working 84 contacts & 8 sections during contest. Conditions good to west, southwest.
June 26 K9JAM (Chicago) wrkd VE3EYX (Blenheim, Ont.) 295 mi, W8ANZ/8 (Plymouth, Ohio) 265 mi, W8EST/8 (North Branch, Mich.) 250 mi., W8IAD/8 (Deckerville, Mich.) 280 mi. 0024-0538.
July 2 K9JAM (Ill.) wrkd W8SDJ (Milford, Ohio) 260 mi. 0216.
July 5 WA8KBJ, WA8KOS (brothers) in Royal Oak, Mich. wrkd K9LMR (Wheeling, Ill.) 250 mi, K9WFA (aurora, Ill) 280 mi., K9HMB (Deerfield, Ill.) 250 mi, WA9BMU (streamwood, Ill.) 280 mi 2107-2255 ssb. WA8IAU (Chesterland, Ohio) wrkd W9YOI (Mundelein, Ill) 350 Mi., K9HMB at 350 Mi., K9YGZ (New Berlin, Wisc.) 410 mi. 2158-2218.
July 6 K3GGZ (Enon Valley, Pa.) wrkd K9YGZ (New Berlin, Wisc.) 440 mi. Hrd W9YOI · WA8IDU (Canton, Ohio) wrkd K9YGZ (Wisc.) 440 mi., W9YOI 400 mi. 0035. WA8IAU (Ohio) worked WA8LLY (Mich.) 280 mi. 2035. WA8KBJ-WA8KOS wrkd K9RVG Chicago 250 mi. ssb.
July 12 WA8KBJ, WA8KOS, W8AOE, WA8DOJ (all Royal Oak, Mich. wrkd WØDQY (St. Louis, Mo.) 500 mi. 2252 SSB. WA8IDU (Ohio) hrd KØIOD (St. Clair, Mo.) and WA4ELH (Fort Thomas, Kentucky).
July 13 WA8KBJ, W8WZB (lnear Detroit) wrkd WA9FVR (Greenwood, Ind.) 280 mi. 2330. WA8IDU (Ohio) wrkd K9KEM (Georgetown, Ill.) 384 mi., K9SBQ (Jerseyville, Ill.), 538 miles, W9JMF (Taylorville, Ill.) 500 mi., K9CHV (Marion, Ind.) 290 mi. 2330.
July 14 WA8KBJ (Mich) wrkd WN8OUB (Cincinnati) 245 Mi. .0018
July 16 K3HHC (Beaver Falls, Pa.) hrd K9KEM, K9SBP, W9CHV, WA9WAG, W9JMF, VE3BVK.
July 17 WA3BRA (Balt., Md.) wrkd K1TPK (Portsmouth, R.I.) 310 mi. .0042.

220 Mc.

June 1-6 K8ZES (Galion, Ohio) reports skeds with W8DQU (Bedford, Ohio) 75 mi. Sid used 25 watts of FM with some difficulty. W8CSW (Powell, Ohio) and W8DQU (Bedford, Ohio) 125 mi. have nightly skeds. K8ZES also reports that W9HLY in Decatur, Ind. had good signals on June 1.
June 7 K8ZES running 100 watts a.m. wrkd W8DQU 75 mi. Good reports. Skeds main-
June tained from June 8 thru 23rd.

432 Mc.

June 4 K8ZES (Galion, Ohio) worked W8UCT, W8FWF (both near Detroit) 110 mi.

144 MC. WEAK SIGNAL SOURCE

by "Skip" Freely, K6HMS*

The adjustment of VHF converters and preamplifiers for best signal-to-noise ratio can be a difficult job without some type of test equipment. What most hams do is adjust for maximum "S" meter reading on a received signal, and this method leaves much to be desired. It is primarily a gain adjustment. What they should do is tune for best signal to noise ratio by adjusting for maximum signal over background noise on a weak signal. While this method is a lot better than nothing it has several shortcomings, some of which are:

1. You often have no control over the time when the station you're adjusting to is on the air or how strong he is.

2. Variations in propagation make all but short-term observations highly questionable.

3. You can't compare your converter's performance before and after major alterations in its design such as use of different tubes, different L/C ratios, voltages, currents, etc.

4. It is difficult or practically impossible to compare your converter with converters of a number of other hams. Such comparisons often show serious shortcomings in performance.

Of course the noise generator is the instrument used to get a measurement of the noise figure---the meaning of which is widely understood. For those of you without the funds or knowledge needed to make valid noise figure measurements, the weak-signal source to be described is very inexpensive, easy to build and very, very useful. Even if you do have a noise generator the weak-signal source is a good device to use in conjunction with the noise generator. The weak signal produced is not quantitative, but it is quite reproducible from day to day or month to month and is very controllable in its amplitude. My two-meter version of this instrument, originally designed by Mel Baer (W6WSQ), is shown in the photograph of Fig. 1.

What is inside is shown in the diagram on the front cover of this issue. It is a one-tube crystal oscillator operating at 8 Mc., a small power supply and a voltage-regulator tube. Most parts can come from the junk box. The crystal can be any frequency that has a harmonic at the frequency you want to "peak" your converter.

DESCRIPTION OF OPERATION

The 6AK5 or 5654 operates as a triode oscillator at 8 Mc. since the plate and screen are connected together and there are no tuned circuits. R.F. output is taken from the cathode. The amplitude of the oscillations varies with the plate voltage, which is controlled by the Output Adjust control (Sensitivity in the photo). Plate voltage is derived from a voltage divider across a gas-tube regulator (5651) which regulates the supply voltage to about 85 volts. The power supply is a simple half-wave rectifier into a two-section RC filter. The current drain is so small a choke is not needed.

Since the signal is generated at a low frequency (8 Mc.) and all frequency multiplication is done in the oscillator, the output at 144 Mc. is quite weak. This is due to the inefficient harmonic-generator action of the oscillator. The coupling for the output is well-isolated from the oscillator and it does not affect the stability of the signal.

Several variations of the circuit may be tried. A tuned circuit for 144 Mc. may be included in the cathode circuit or a germanium diode may be used. Both these devices would enhance the desired high-order harmonics. The Output Adjust pot could be a ten turn device with a counter dial for logging purposes. I used an Allen-Bradley precision

*187 E. 22nd St., Costa Mesa, Calif.

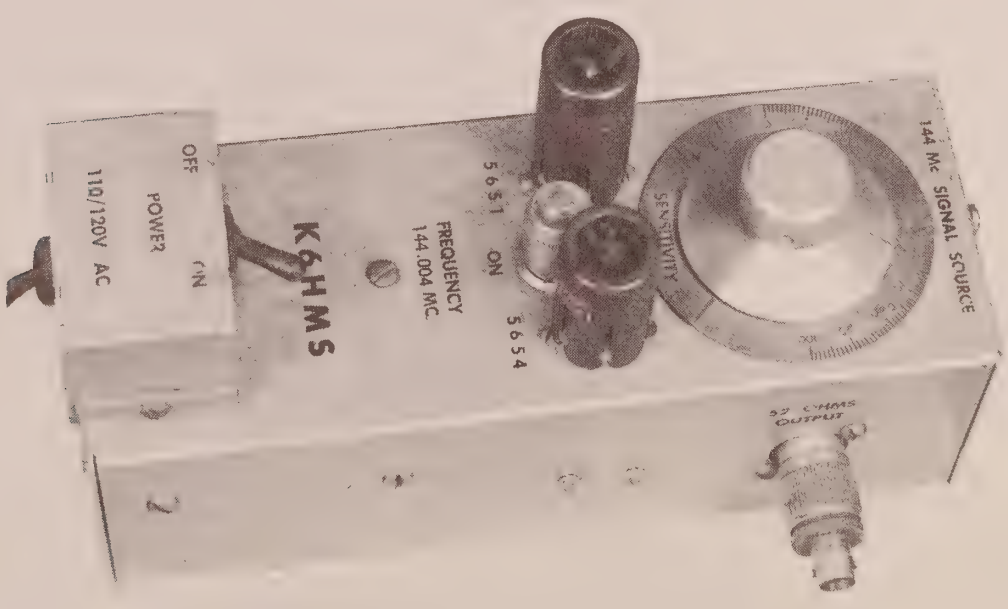
type with a 0-100 logging scale. CAUTION: For meaningful comparisons it is important to use the same output cable. For that reason I have an 18" cable terminated in a BNC plug and use adapters to other connector types.

To use this instrument, connect its output to the input of the converter being tested, turn the Output Adjust control fully clockwise and locate the signal on the receiver. Then reduce the output until the signal is just barely discernible in the noise. The reading of the scale at this point should be recorded for future comparisons---either with the same converter or with others.

This unit has one particular attribute that is quite valuable. Most signal generators available to hams are not usable as test instruments to generate very weak signals. The reason is that the attenuators in them are poor, there is leakage of the signal outside the cabinet or the frequency stability is not good. The effect of R.F. leakage in a signal generator makes poor converters look good because even though the attenuator scale shows the signal output is extremely low, signal leaking thru the attenuator or by other paths may be fairly high. In this instrument the oscillator output is reduced by means of the Output Adjust control so any leakage through the box is being reduced in the same proportion as the signal. In most commercial generators the oscillator continues to run at full output. For this application--one frequency and one mode (c.w.)--this weak signal source is far superior to some rather expensive commercial instruments. For most good converters or receivers, a signal of .1 microvolt is a big signal, and most signal generators leak a tenth of a microvolt. From that level on down, this device takes over.

Frequency stability of the signal source is very important when testing signals down in the noise. This unit is very stable for any setting of the Output Adjust control, but frequency does change a bit when this control is changed very much. It will be necessary to retune the receiver slightly to re-peak the signal on a sharp filter when a very weak signal is used.

This weak signal source has been very popular on the West Coast for several years, and many converters have been evaluated with the various units built. If you bring your converter to a west coast convention or technical meeting on VHF, chances are that Ed Tice, W6NGN, will greet you by plugging his weak-signal source into your converter. I hope you'll find your weak signal source as useful as I've found mine. End.



TIN CAN RESONANT CIRCUITS

by Louis Hutton, K7YZZ*

The use of tin cans as resonant coaxial circuits in filters and two-meter converters has been described in recent articles. [1, 2] No information could be found as to what size cans would resonate in the various VHF/UHF bands. Six different tin-plated steel cans were acquired and checked for frequency coverage with the results shown in Table 1.

Center conductors of various diameters (1/8 inch to 5/8 inch diameter) were tried with no observable change in characteristics. Piston-type tuning condensers, compression trimmers, and ceramic trimmer condensers were tested as tuning condensers. The piston and compression types were the easiest to use. Precise tuning could not easily be achieved with the ceramic trimmers. They require additional torque, and the thin metal cans and flimsy support of the center rod did not provide enough mechanical stability.

Tapped line and link inputs as shown in Figure 1 were tried with good results. The resonant frequency may be determined by coupling the coil of a grid dipper close to the input link or the open end of the tin-can coaxial circuit.

A 432 Mc. converter has been constructed using tin cans as resonant circuits. It was described in the June issue of VHFER.

TABLE I

CAN SIZE Diameter	CAN SIZE Height	DIAMETER OF CENTER CONDUCTOR	TUNING CONDENSER CAPACITY (mmfd.)	FREQUENCY (Megacycles)
2 1/8"	2 7/8"	3/16"	5-25	432
2 3/16"	3 1/2"	3/16"	3-15	432
2 3/16"	3 7/8"	3/16"	3-15	432
2 5/8"	4 7/8"	1/2"	5-25	225
3 3/8"	7"	3/8"	5-25	144
4 1/4"	7"	3/8"	5-25	144

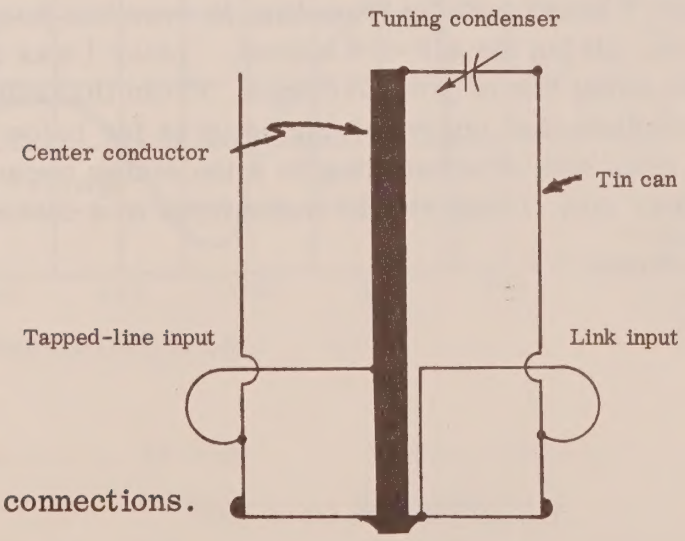
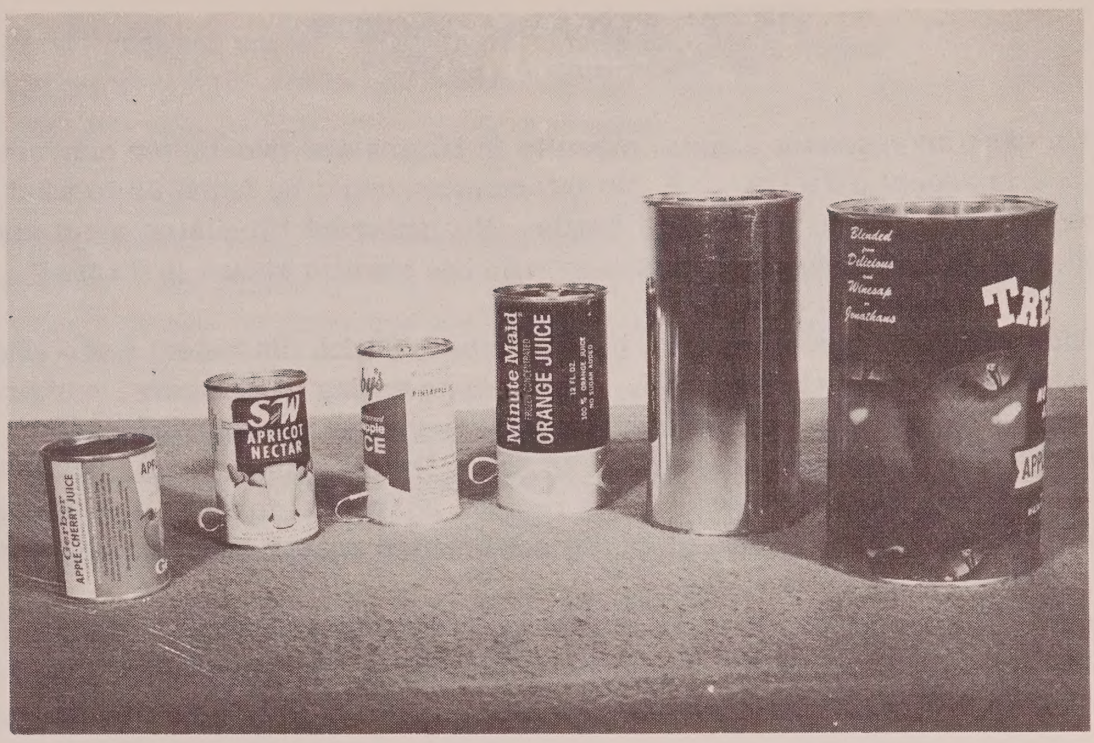


Figure 1.
Tin can input or output connections.

1. Radio Amateur's Handbook, 42nd Edition (1965) Page 55.
2. 73 Magazine, May, 1965 Page 40 2 Meter Beer Can Cavities.

*12235 S.E. 62nd, Bellevue, Wash. 98004

(next page)



DX REPORT

by Lew Munford, W8YIO*

This report came to us with a preamp. returned for service. It had been damaged in shipment so much the piston capacitor was broken, completely detuning the thing. Lew's report on his frustration was so interesting to me I thot you might like to hear it. K7AAD.

On July 13 the band opened up to the south and I worked W5RCI on two meters with good signals both ways, he on SSB and I on CW. I switched over to 432 CW and called him. He rebroadcast my 432 sigs back to me on two meters and we worked duplex for a few minutes. Then he switched over to 432 and called me. Despite the fact that he runs 10 times the power that I do, I could not find any trace of his signal. After 45 minutes trying we finally gave up. Later that nite I got hold of W5JWL in Arkansas on two and asked him to listen for me on 432. He heard me on the first call. Then he switched to 432. Except for one brief instant I heard nothing from him in over two hours of trying. He hrd me for the whole two hours, giving me a 5-5-9 report. Later I was able to work W4TKH in Lexington, Ky. He was using one of your preamps. From this situation and other similar contacts I can only conclude that my receiving setup is far below that of other stations on the band. It has been very discouraging to miss states because of not being able to hear <u>them</u> when they hear me. I only run 25 watts input to a Motorola FM transmitter.

Box 11, Bridgewater, Michigan

BACK ISSUES OF 6 UP

We have all the back issues of 6 up that exist in any quantity. We have packaged up what there is in bundles of 12. You may have all 12, postpaid, for $2. Essentially, the magazines are free. It was the freight shipment here, the postage and the bundling and processing your order that eat up the two bucks. Old VHFERs almost don't exist. Sorry we can't answer your inquiries individually. The paperwork here is terrible.

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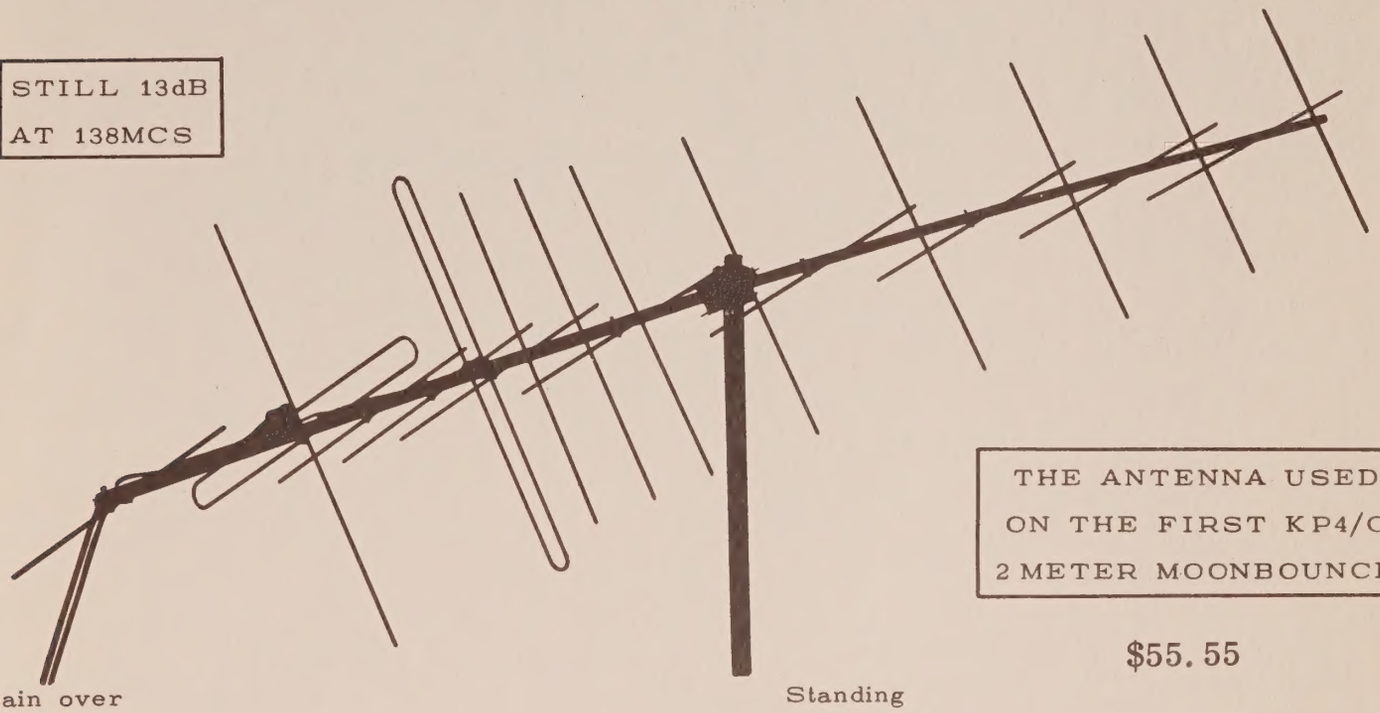
MOONBOUNCER

SATELLITE TRACKING ANTENNA

STILL 13dB
AT 138MCS



THE ANTENNA USED
ON THE FIRST KP4/G
2 METER MOONBOUNCE

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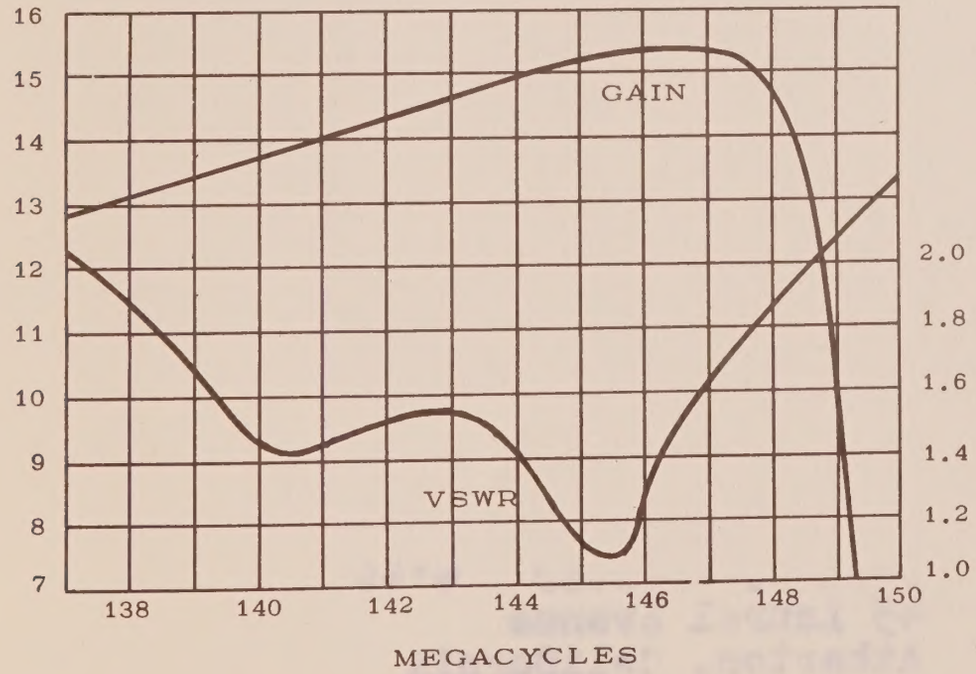
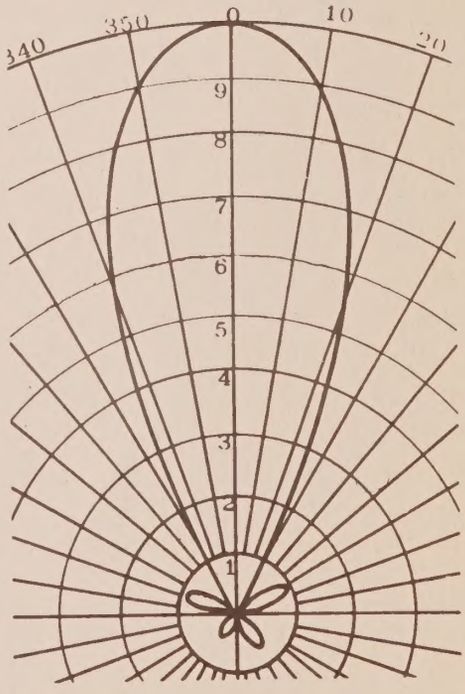
dB gain over isotropic

Standing wave ratio





Gain over isotropic	15.4dB	Turning Radius	104"
Front/back ratio	30dB	Net Weight	13.9lbs
½Power beamwidth	33°	Stacking distance above or alongside	132"
Boom length	194"	Wind area	3.4sq.ft.
Width	41"	Wind load at 100mph	83 lbs.

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WEST COAST VHF REPORT

By Al Olcott, K7ICW*

W7HDP at Great Falls, Montana tells me that a 450 Mc. repeater (receiver) near his location has been receiving 15-25 watt mobile stations in Louisiana and Indiana on 450 Mc. starting at 1100 MST.

K6QKL/7 at Tacoma, Wash. says that the 6161 tube which can be obtained for $7.50 will operate full limit on 432 and 1296 Mc. and the socket is even cheaper! (so he says)

A 220 Mc. net using 222.000 Mc. has been operating in the L.A./Orange area on Sun. nites 2000-2230 PDT with K6IBY or K6SQH hosting as net control. The net is expected to get more active in the fall months after vacation time.

W5MJW at El Paso, Texas is interested in 50 Mc. scatter skeds, CW or SSB, 50.010 or 50.110 Mc. Sat & Sun. mornings. "SL" is also interested in 2 meter work but must transmit above 145.000 Mc. Cross frequency work at the low end is OK. W5MJW has heard regular signals from WØEYE (Colorado) and the Tucson area on tropo/m.s., and also Fla. on one occasion.

K6IBY is looking for schedules on 220 Mc., 221.5 Mc. up for long-distance DX including meteor scatter.
K6AZL is operating from Susanville, Calif. with high power on 2 meters (East of the Sierras) and would like skeds. Write Earl C. Jennings, 125 N. Pine St.

50 Mc. opened up here June 13. Stations worked were in Oregon, Wash., VE7, Calif., Iowa, Okla, Ark., Texas, Kansas, Missouri, S. Dakota, Colo., Wyo., N. Dak., Tex., Ill., Minn., Tenn. and South Carolina. On June 19 the band opened to all U.S. call areas plus VE4, VE6, & VE7.

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